AMENDMENTS

In the Claims

Current Status of Claims

1.(**currently amended**) An apparatus for performing low level sulfur UV fluorescence detection comprising:

an oxidation or combustion chamber including:

a sample inlet,

an oxidizing agent inlet,

an oxidation zone, and

an oxidized sample outlet;

a transfer tube connected to the oxidized sample outlet;

an UV interference reduction system capable of reducing or eliminating interference from nitrogen oxides permitting detection of sulfur in concentrations below 100 ppb; and

a detector/analyzer system including:

an excitation light source,

an UV chamber having:

an excitation light port in optical communication with the light source,

an oxidized sample inlet connected to the transfer tube,

an oxidized sample outlet for exhausting the oxidized sample from the chamber after irradiation from the excitation light,

a fluorescent light port oriented at an angle to the excitation light, where the angle is sufficient to reduce or eliminate excitation light from entering the fluorescent light port;

a fluorescent light detector in optical communication with the fluorescent light port capable of converting the detected light into an electrical output signal, and

an analyzer in electrical communication with the detector for converting the electrical output signal into a concentration of sulfur in the sample based on sulfur dioxide fluorescence.

2.(**currently amended**) The apparatus of claim 1, wherein the ~~nitrogen removal~~ UV interference reduction system comprises an ozone generator.

3.(**currently amended**) The apparatus of claim ~~1~~2, wherein the generated ozone is introduced into the oxidizing agent inlet of the combustion chamber.

4.(**currently amended**) The apparatus of claim ~~1~~2, wherein the generated ozone is introduced into the oxidizing zone through an ozone inlet.

5.(**currently amended**) The apparatus of claim ~~1~~2, wherein the generated ozone is introduced into the combustion chamber at its distal end through an ozone inlet.

6.(**currently amended**) The apparatus of claim ~~1~~2, wherein the generated ozone is introduced into the transfer tube.

7.(**currently amended**) The apparatus of claim ~~1~~2, wherein the generated ozone is introduced into an ozone chamber interposed between the combustion chamber and the UV chamber through an ozone inlet.

8.(**currently amended**) The apparatus of claim ~~1~~2, wherein the generated ozone is introduced into a first sub-chamber of a bifurcated UV chamber through an ozone inlet.

9.(**currently amended**) The apparatus of claim ~~2~~1, further comprising a nitrogen gas removal system ~~into~~ connected to the oxidizing agent inlet to remove trace amounts of nitrogen gas (N_2) in the oxidizing gas prior to the oxidizing agent entering the oxidizing agent inlet of the combustion chamber.

10.(**original**) The apparatus of claim 1, wherein the UV chamber further includes an optical filter associated with the fluorescent port and the detector is a PMT.

11.(**cancel**)

12.(**cancel**))

13.(**currently amended**) The method of claim ~~1~~21, wherein the ~~nitrogen removal~~ ~~UV interference reduction~~ agent comprises a NO reactive species selected from the group consisting of ozone and hydrogen peroxide.

14.(**currently amended**) The method of claim 13, wherein the ~~nitrogen removal~~ ~~UV interference reduction~~ agent comprises ozone.

15.(**original**) The method of claim 14, wherein the ozone is introduced into the oxidizing agent.

16.(**original**) The method of claim 14, wherein the ozone is introduced into the oxidizing sample.

17.(**original**) The method of claim 14, wherein the ozone is introduced into the oxidized sample.

18.(**currently amended**) The method of claim ~~11~~21, further comprising the step of:

contacting the oxidizing agent with a nitrogen gas removal reagent to reduce or eliminate nitrogen gas ~~from~~ present in the oxidizing agent.

19.(**currently amended**) The method of claim ~~11~~21, wherein the oxidizing ~~gas~~ agent comprising an oxygen containing gas.

20.(**currently amended**) The apparatus of claim 1, wherein the oxidizing ~~gas~~ agent comprising an oxygen containing gas.

21.(**new**) A method for improving low level sulfur detection using UV fluorescent spectrometry, comprising the steps of:

introducing a sample and sufficient oxidizing agent to completely oxidize all oxidizable sample components into their corresponding oxides into a combustion chamber for a time and at an elevated temperature sufficient to convert substantially all oxidizable components into there corresponding oxides to produce an oxidized sample; and

introducing an UV interference reduction agent into the sample, the oxidizing agent, the oxidizing sample and/or the oxidized sample in an amount sufficient to substantially eliminate interfering nitrogen oxides to produce a modified oxidized sample,

forwarding the modified oxidized sample to a UV chamber,

irradiating the modified oxidized sample with excitation light,

detecting fluorescent light emitted by electronically excited SO_2 molecules in the modified oxidized sample, and

converting the detected light into a concentration of sulfur in the sample where the UV interference reduction agent is adapted to improve sulfur detection limits to sulfur concentration levels below 100 ppb.

22.(**new**) The method of claim 21, wherein the UV interference reduction agent is adapted to improve sulfur detection limits to below 50 ppb.

23.(**new**) The method of claim 21, wherein the oxidizing agent comprising an oxygen, oxygen in argon, ultra-pure oxygen, ultra-pure oxygen in argon, or ultra-pure oxygen in ultra-pure argon.

24.(**new**) The method of claim 21, further comprising the step of:

adjusting the ozone concentration to simultaneously minimize interfering NO fluorescence and ozone absorption of excitation light and/or SO_2 fluorescent light during SO_2 fluorescence detection.

25.(**new**) The apparatus of claim 1, wherein the UV interference reduction system capable of reducing or eliminating interference from nitrogen oxides permitting detection of sulfur in concentrations below 50 ppb.

26.(**new**) The apparatus of claim 1, wherein the oxidizing agent comprising an oxygen, oxygen in argon, ultra-pure oxygen, ultra-pure oxygen in argon, or ultra-pure oxygen in ultra-pure argon.

27.(**new**) The apparatus of claim 1, wherein the ozone generator produces variable concentrations of ozone to simultaneously minimize interfering NO fluorescence and ozone absorption of excitation light and/or SO_2 fluorescent light during SO_2 fluorescence detection.